of the earth, but the effect was generally compared to that of a heavily loaded wagon passing over frozen ground.

Point Judith, 27th: At 10.15 p. m., an earthquake shock occurred lasting five seconds, accompanied by a rumbling sound; a second shock of less force was felt at 10.18 p. m., and a third, very feeble, occurred at 10.28 p. m. The movement was apparently from east to west.

Narragansett Pier, 27th: A severe shock of earthquake was felt at 10.15 p. m., accompanied by a low, rumbling sound, of fifteen seconds duration. All houses were badly shaken and the inhabitants frightened. A second, but less severe shock, occurred at 10.18 p. m., lasting five seconds; and a third shock, very light, of three seconds duration was felt at 10.28. The direction of movement was from east to west.

Block Island.—At 10.15 p. m. this island was visited by a severe shock of earthquake which lasted about eight seconds. It appeared to pass from the west, and when nearest produced a noise resembling that made by a passing train. Houses were badly shaken. The keeper of the Southeast Light reports that articles in the light tower were displaced by the shaking of the building. A second shock, very faint, was felt at 10.17 p. m. The captain of a pilot-boat, while off Fire island observed a large meteor at 10 p. m., passing from east to west. It was so brilliant, that a paper could have been read without difficulty from its light. The meteor was observed at Block Island just before the first shock was felt.

Massachusetts.—New Bedford, 27th: a shock of earthquake was felt here at 10.30 p. m., accompanied by a rumbling sound and tremor, resembling that caused by a heavily loaded wagon passing over frozen ground.

Heath, 27th: A light shock of earthquake was felt throughout the city at 10.20 p. m.

Fall River, 27th.—At 10.20 p. m., a noise was heard sounding like the firing of a heavy ordnance, and was accompanied by a vibration of the earth, causing windows, etc., to rattle.

Barrington, 27th.—An earthquake shock was felt at about 10 p. m., in various parts of the town, sufficient to shake buildings with considerable force.

California.—San Diego, 6th: a slight earthquake shock occurred here at 4.30 p. m.; the direction of movement was from north to south.

The bark "Siddartha," in N. 20° 04′, W. 67° 45′, on February 19th, at 7 p. m., experienced a sharp shock of earthquake which lasted about twenty-five seconds. The ship trembled as if dragging over a hard bottom; found no soundings at thirty fathoms.

SAND-STORMS.

Camp Thomas, Arizona, 2d, 19th.
Tucson, Arizona, 18th, 19th.
Yuma, Arizona, 2d, 4th.
Fort Yuma, California, 14th.
Fort Garland, Colorado, 1st, 2d.
Fort Union, New Mexico, 15th.
El Paso, Texas, 3d, 6th, 15th.

POLAR BANDS.

Los Angeles, California, 19th.
Wicklow, Dakota, 7th, 11th, 25th, 26th, 27th.
Washington, District of Columbia, 20th.
Augusta, Georgia, 3d, 8th, 25th.
Riley, Illinois, 20th.
Guttenburg, Iowa, 22d.
Keokuk, Iowa, 4th.
Yates Centre, Kansas, 1st, 5th, 21st.
Point Pleasant, Louisiana, 25th, 27th.
Gardiner, Maine, 17th.
Dudley, Massachusetts, 2d.
Lansing, Michigan, 6th, 9th, 21st.
Protem, Missouri, 1st, 12th, 20th, 25th, 27th.
Clear Creek, Nebraska, 12th, 21st.
Freehold, New Jersey, 8th.
Moorestown, New Jersey, 9th.
Rochester, New York, 6th.
Catawissa, Pennsylvania, 9th.
Nashville, Tennessee, 12th, 14th, 18th, 21st.
Palestine, Texas, 23d.
Marion, Virginia, 28th.
Wytheville, Virginia, 1st, 10th, 13th, 20th.

ZODIACAL LIGHT.

In the various states and territories, it was visible on the following dates:—

Arizona.—Prescott, 3d to 7th, 25th to 28th.
Connecticut.—New Haven, 7th, 8th, 25th, 26th.
Dakota.—Wicklow, 3d to 7th, 9th, 24th, 25th to 28th.
Florida.—Punta Rassa, 1st.
Georgia.—Augusta, 4th.
Illinois.—Springfield, 26th, 27th, 28th.
Indiana.—Wabash, 7th, 8th.
Iowa.—Cresco, 4th, 7th, 8th, 9th, 28th; Monticello, 1st, 5th, 8th, 9th, 27th.
Kansas.—Lawrence, 3d, 7th; Salina, 26th, 27th, 28th; Yates Centre, 7th, 25th.
Maine.—Cornish, 4th, 5th, 7th, 8th, 9th.
Massachusetts.—Cambridge, 1st, 5th, 7th, 8th, 9th, 23d, 25th to 28th; Rowe, 8th, 9th; Somerset, 5th, 7th, 8th, 26th, 28th.
Minnesota.—Northfield, 3d, 4th, 5th, 7th, 9th, 27th, 28th.
Nebraska.—Clear Creek, 7th, 24th to 28th.
Oregon.—Albany, 1st, 2d, 6to to 9th, 22d, 23d.
Pennsylvania.—Dyberry, 7th; Haverford College, 14th.
Tennessee.—Nashville, 1st, 2d, 3d, 8th, 25th to 28th.
Texas.—Fort McKavett, 28th; Palestine, 19th.
Virginia.—Variety Mills, 1st, 5th, 7th, 8th, 26th, 27th, 28th.
Wisconsin.—Franklin, 7th, 8th, 9th, 27th, 28th; Manitowoc, 27th.

PRAIRIE AND FOREST FIRES.

Little Rock, Arkansas, 1st.
Creswell, Kansas, 28th.
Independence, Missouri, 19th to 22d, 25th to 28th.
Protem, Missouri, 1st, 20th, 26th, 27th, 28th.
Coleman City, Texas, 2d.
Fort Concho, Texas, 1st.
Fort McKavett, Texas, 2d, 24th, 25th.
Fort Sill, Texas, 21st.

MIGRATION OF BIRDS.

Geese flying northward.—Sacramento, California, 19th; Fort Madison, Iowa, 17th, 27th; Swanwick, Illinois, 22d, 24th; Independence, Kansas, 21st; Yates Centre, Kansas, 27th; Salina, Kansas, 14th; Pretty Prairie, Kansas, 19th; Clear Creek, Nebraska, 22d, 26th, 28th; Genoa, Nebraska, 26th; Superior, Nebraska, 27th; Augusta, Georgia, 24th; Fort Sill, Indian Territory, 21st; Lewiston, Idaho, 22d; Portland, Oregon, 22d; Cape Mendocino, California, 21st. *Flying southward.*—Creswell, Kansas, 11th; Fort Riley, Kansas, 25th; Augusta, Georgia, 19th, 25th. *Flying west.*—Creswell, Kansas, 7th, 25th; Fremont, Nebraska, appearing in large numbers, 22d; Wellington, Kansas, appearing in large numbers, 25th to 28th.

Ducks flying northward.—Sacramento, California, 19th; Charleston, Illinois, 20th; Swanwick, Illinois, 22d, 24th; Yates Centre, Kansas, 21st, 23d, 26th, 27th; Fort Scott, Kansas, 28th; Clear Creek, Nebraska, 22d, 28th; Genoa, Nebraska, 27th; Toledo, Ohio, 25th. *Flying southward.*—Creswell, Kansas, 26th; Superior, Nebraska, 27th; Palestine, Texas, 11th; Wellington, Kansas, appearing in large numbers, 25th to 28th.

NOTES AND REMARKS.

NOTE.—The Chief Signal Officer has received a copy of the report of meteorological observations made at the Carson Observatory, Carson City, Nevada, during 1880, 1881, and 1882, by Mr. Charles W. Friend.

The following summary is taken from the "First Monthly Report of Weather Service for Tennessee," February, 1883:—

Station.	County.	Name of observer.	When observations began.	Maximum temperature.	Minimum temperature.	Rainfall.	No. of days on which rain or snow fell.	No. of clear days.	Dates of frosts.	Dates of snow.	Dates of thunder-storms.
Sailors' Rest	Montgomery	John Minor	16	.....	.....	15.00?	3	8	19,20,21	.....	...
Springville	Henry	H. A. Boden	10	67	18	3.16	7	2	.....	17,18	...
Tibbs	Haywood	J. A. Moore	22	.....	40	0.47	3	4	26,27	.....	...
Grassy Cove	Cumberland	Nettie M. Stratton	4	73	20	3.92	19	8	.....	.....	15
Manchester	Coffee	Wiley Hickerson	7	75	23	2.70	9	5	18,19,20 21	.....	...
Beech Grove	Coffee	B. F. Cheatham	1	78	25	4.02	17	...	.....	.....	...
Maryville	Blount	W. H. Henry	19	.....	.....	0.66	4	5	19-22,26 27	.....	...
McNairy	McNairy	J. H. Blakely	22	75	27	0.70	3	3	26,27,28	.....	...
Covington	Tipton	T. W. Roane, M.D.	16	80	20	2.55	4	5	19,20.21 26,28	.....	...
Little Sewell	McMinn	J. Zeigler	7	.....	.....	1.08	6	5	.....	.....	...
Bolivar	Hardeman	E. P. McNeill	16	78	20	2.40	4	6	25,26	.....	16
Alexandria	Smith	Irenus Beckwith	15	75	28	1.82	6	4	19,20,26 27	.....	...
McKenzie	Carroll	John Brown	10	70	22	3.25	5	8	12,13,19 20,25,26 27	.....	...
Huntingdon	Carroll	J. S. Ramsey, M.D.	14	76	19	1.18	6	7	20,21,26 27	.....	...
Waverly	Humphreys	D. R. Owen	1	80	19	8.04	16	7	6,7,23 26	.....	...
Milan	Gibson	M.D.L.Jordan,M.D	16	76	18	1.78	5	8	19,20,21 25,26,27	.....	...
Kingston Sp'gs	Cheatham	W. J. Innman	17	.....	.....	.....	4	5	.....	.....	17
Flat Creek	Bedford	Wm. Hart	1*	74	24	3.43	16	...	19,20,21 26,27	.....	...
Troy	Obion	W. H. Caldwell	10	.....	.....	11.50?	9	...	.....	17	...
Gadsden	Crockett	M. T. Moore	10	.....	.....	5.19	8	...	.....	18	...
Benton	Pope	Jim Hood	19	.....	.....	0.98	3	4	20,21,26	.....	...
Hohenwald	Lewis	A. P. Grover	16	.....	.....	2.37	4	...	.....	17	...

* Observations of rainfall from 1st; others from 15th.

The following letter is also taken from the same report:—

BUREAU OF AGRICULTURE, STATISTICS, AND MINES,
Nashville, Tennessee, March 5, 1883.

To his Excellency, W. B. BATE,
Governor of Tennessee.

SIR: Deeming it my duty, as it was also my earnest desire to promote in every practicable way, the development of the great industrial interests of Tennessee, and especially her agricultural interests, upon which the prosperity of our citizens so largely depends, and being convinced that a more thorough and accurate knowledge of the climatic conditions of our state is necessary to a full development of our agricultural resources, I have established under the control of this bureau, and with the kindly co-operation of General Hazen, Chief Signal Officer of the U. S. Army, a system of Weather Service for Tennessee. General Hazen agreed to furnish the necessary rain-gauges, books of instruction and blank forms for reports as well as free envelopes for the transmission of reports and correspondence through the mails.

In pursuance of this plan about fifty stations for observations have been established during the past month and many of them have submitted reports of observations embracing generally the latter half of the month. An analysis of these peports is herewith submitted. Considering the blanks furnished by General Hazen as too complicated for use by observers without special training and a full supply of scientific instruments, I prepared a simpler form which is now being used.

It is regarded as very important that at least one of these stations should be established in each county of the state, to the end that the monthly reports, as they are tabulated and published at this office shall give a full history of the climatic conditions of each county during the preceding month.

The reports thus far submitted indicate both zeal and intelligence on the part of the observers, and there can be no doubt that the facts which they are enabled to report with their present limited facilities will be of immense advantage. I respectfully submit however that in order to enable them more fully to meet the necessities of their work it is important that they be furnished with some additional instruments; especially that each station have one dry and one wet-bulb thermometer, and one maximum and one minimum thermometer. With these instruments they will be fairly equipped for their work. As the observers give their labor gratuitously, and as the service so far as organized has cost the state nothing but an inconsiderable item for printing, I most earnestly suggest that an appropriation to supply these instruments would be a measure of wise economy. From correspondence I am enabled to state the cost of the designated instruments of standard make would be $16.25 for each county furnished, or an aggregate of $1,560 for the State. Respectfully, A. W. HAWKINS,
Commissioner of Agriculture, Statistics, and Mines.

The following meteorological summary has been received from Mr. S. R. Thompson, Director of the "Nebraska Weather Service:"

BULLETIN FOR FEBRUARY, 1883.

This month was cold, with humidity above normal in the western, and below in the eastern, part of the state

Rainfall.—The average by sections was as follows: southeast, 1.00 inches; northeast, 1.07; southwest, 0.74; northwest, 0.84. Average for entire state, .96, which is slightly in excess of the usual amount.

Temperature.—The mean temperature of the air was 20°.3, which was almost exactly that of February, 1881, and about 6° colder than the mean of many years. Average of all noon observations, 27°.8.

The following are some of the maximum and minimum temperatures reported: –

Omaha, maximum, 51°.2; minimum, —24°.9.
North Platte, maximum, 52°.3; minimum, —29°.
De Soto, maximum, 52°; minimum, —22°.
Agricultural College, maximum, 61°; minimum, —22°.

Mean Relative Humidity.—Omaha, 66.5; North Platte, 74.4; Agricultural College, 76.6.

Wind.—Miles traveled: Omaha, 5,134; North Platte, 5.784; Agricultural College, 5,910.

Mean direction: Omaha, north; North Platte, west.
Greatest velocity: Omaha, 24 miles per hour; North Platte, 36 miles.

Miscellaneous.—Thunder and lightning at Peru on the night of the 15th.
Ice broke up in the Republican river on the 15th.
Wild ducks and geese seen at various places on the 15th.
Miss Flora Buck reports a beautiful halo with four parhelia on the 16th, at Red Willow.
Sowing wheat began in Buffalo county on the 28th.

The following extract is taken from "Science," of March 9, 1883:—

METEOROLOGY.

Thermal belts of North Carolina.—Professor J. W. Chickering read a paper on this topic, reciting the observations of Mr. Silas McDowell and others. The valley of the Little Tennessee river, in Macon county, is about 2,000 feet above tide. When the thermometer indicates a temperature of about 26° F., the frost extends about 300 feet in vertical height up the mountain sides, and there ceases, appearing again 400 feet higher. In the intervening belt, the most delicate plants remain untouched; and so sharp are the dividing-lines, that sometimes one half of a shrub may be frost-killed, while the other is unaffected. Following a tributary stream upward from the valley, one passes three mountain-barriers, and enters in succession three valleys, the highest of which is plateau-like, and 3,900 feet in altitude. The vernal zone appears in each valley, rising as the valleys rise, but somewhat less rapidly; so that in the highest it is only 100 feet above the plateau. In this frostless zone the Isabella grape not merely has ripened for twenty-six consecutive years, but is free from mildew, blight, and rust. In Polk county a similar belt is said to skirt the Tryon mountains, extending from 1,200 to 2,200 feet above tide. This is untouched by frost until the latter part of December, and is usually free from snow; while the mountains above and the valleys below are covered. The peculiar stratification of the air indicated by these statements merits scientific investigation.—(*Phil. soc. Washington; meeting Feb.* 24.)

ERRATA.

In the REVIEW for December, 1882, under the heading DEVIATIONS FROM MEAN TEMPERATURE, on page 13, the mean temperature at North Volney, New York, should read 25°.46, and not 45°.46; and the table of mean temperatures for Snowville, Virginia, should have been for Johnsontown, Virginia. On page 16 (same REVIEW), the table showing average rainfall at Snowville, should also have been for Johnsontown.